

ESCO IN STREETLIGHTING

Introduction

The Vijayawada Municipal Corporation (VMC) is incurring an expenditure of nearly a crore rupees every month towards energy bills for water supply, street lighting, drainage pumping stations and buildings. As part of its Silver Jubilee Celebrations from June 2006 to May 2007, the VMC has set itself the objective of becoming the country's first energy efficient City. An energy audit of the Corporation has already been done, and different components of the Energy Conservation Action Plan has been initiated. It was proposed to introduce energy saving technologies into street lighting.

As a precursor to installing energy saving technology across the City, a small area was selected and the technology piloted. In June and July, 2005, energy saver devices were installed by M/s.Servomax India Ltd., in the Sambamurthy Road central road lighting. Results from the two-month long experiment showed 35% saving in power consumption. The VMC engineers visited Bangalore and studied the technology implemented in the Outer Ring Road Energy Saving Project, initiated by the Bangalore Development Authority through an Energy Saving Company (ESCO). After studying the utility and convenience of these systems, the VMC also decided to implement Energy Saving Project for street lighting through an ESCO. Open bids were called for implementation of Energy Saving Project for Municipal Street Lighting, as a full-fledged Operation and Maintenance (O&M) contract through an ESCO, on 30.9.2005.

ESCO Project

An Energy Service Company (ESCO) is a business company that develops, installs and finances Projects designed to improve energy efficiency and reduce the maintenance costs for facilities for a period of time. ESCO generally acts as a Project Development Company for a wide range of tasks and assumes the technical and performance risk associated with the Project. Typically, they offer the following services

- 1) Develops, design and finance energy efficiency projects.

- 2) Install and maintain the energy efficient equipment.
- 3) Assume that the project will save the amount of energy guaranteed.

These services are included in the Project's cost and are to be met from the saving generated.

The main features of the project besides saving of energy include installation of a central computerized control room through which operation of control boxes can be done remotely and the information of switched off lights, energy readings of different central boxes can be known.

VMC Tenders

VMC floated open bids for implementation of energy saving project for Municipal Street Lighting, by inviting ESCO operators, with a contract period of 5 years in January, 2006. This Operation & Maintenance contract invited experienced and qualified bidders to run the street lighting network in the entire City. In response to the tender, bids were received from five firms of which only two qualified in the technical bid. The qualified firms were M/s.Real Energy, Secunderabad, and M/s. ELPRO Dimensions Ltd., Bangalore. Out of the above firms, M/s.Real Energy emerged as successful bidder, as the firm has quoted for 41.5% saving of energy and out of it, the firm offered to take 92.7% as their share towards cost of installations and maintenance of street lighting and to transfer 7.3% to VMC. The VMC is presently spending nearly Rs 60 lakhs annually towards maintenance of street lighting. The details of the two bids are detailed below in the Table 1.

Table 1

S.No.	Description	As per bid of M/s.Elpro Dimension Ltd	As per bid of M/s.Real Energy
1	Expected Energy Savings	30%	41.5%
2	Percentage share of savings to ESCO on energy units saved	90%	92.7%

3	Percentage share of savings to customer (VMC) on energy units saved	10%	7.30%
4	Percentage share of VMC in terms of percentage of total current consumption [(1) x B]	3%	3.029%
5	For maintenance of street lighting including labour and materials (to be paid to the bidder by VMC)	Rs.45.00 lakhs p.a. + 10.2% service tax + 10% extra every year	No extra amount

Contract Economics

During the contract period, the VMC will get Rs.12.00 lakhs per annum as its share in savings and also save Rs.53.00 lakhs in maintenance per annum. Therefore every year, the VMC would get a saving of Rs.65.00 lakhs per annum. During the five year contract period, the VMC will save Rs.3.25 cores. In addition, after the contract period, VMC will be left with the energy saving equipment worth Rs.3.00 crores. At the end of 5 years, VMC will get total benefit of Rs.6.25 crores. Further, after the contract period, the VMC will get annual saving of Rs.170 lakhs in current charges for street lighting. Besides, for savings over and above the assured 42.7%, the VMC will get 75% share and the ESCO will get the remaining 25%.

O&M Problems

One of the major problems associated with finalizing the contract was the need to get the Council to approve the same. The politically left-dominated Council was wary of such privatization, and was repeatedly pointing to the failed service contract of streetlighting in 2002-03. Then the streetlighting in certain zones in the city was handed over to a labor contractor to operate and maintain. The labor contract obliged the contractor to maintain and replace the consumables, for a period of one year, in return for a tender determined unit maintenance rate for each category of light. This contract failed, with the contractor not having made any investment and hence no stake in the system. The successful bidder had no previous experience, and had undercut the rival bidders by quoting very less rates. He ultimately pulled out, not being able to bear the maintenance expenditure. This highlights the perils associated with a badly designed or implemented

O&M contract, whose legacy lives long after its failure, bringing disrepute to the entire process itself.

Risk Allocation Matrix

The entire streetlighting system, with labor, maintenance requirements, consumables etc was bundled into one package and was proposed to be outsourced, so that the inter-related risks are with the operator and not shared between different agencies. Under this model the contractor is also committed to making his investment upfront, in installing power saving devices in all the lights and also networking them, thereby backloading his profits. This would ensure that the operator has stake in the long-term success of the Project and would discourage all fly-by-night operators, out to make a quick profit. Being a pioneering experiment, and given the huge potential of this market, the operator would have great stake in the success of the Project. The financial savings for VMC are very substantial for it to have a huge stake in the success of the Project. The rights and obligations of both the parties were clearly specified and very clear performance parameters linked to incentives and penalties were specified in the contract. The use of technology, by way of networking all the junction boxes, helps in easy monitoring of all the outputs. The easily measurable nature of the outputs - the power consumption, the total lux of all the lights in each box etc - helps in reducing ambiguity in specifying performance standards.

Bid finalization process

An Empowered Committee was constituted for selection of the ESCO and in identifying the appropriate technology for the VMC and in scrutinizing the same. This committee was authorized to recommend the most suitable proposal, and consisted of the following inter-departmental personnel as outline in Table 2.

Table 2

1	Chief Engineer, VMC	Chairman
2	Superintending Engineer, VMC	Member
3	Superintending Engineer, Operation, APSPDCL,	Member

	VJA Circle	
4	Divisional Electrical Engineer, APSPDCL, Operation, Town Division, Vijayawada	Member.
5	Examiner of Accounts – VMC	Member
6	Executive Engineer-II – VMC	Member Convenor
7	Dy.E.E. (Electrical) – VMC	

Before giving approval, a team of Corporators from all parties in the Council, headed by the Mayor visited Nasik Municipal Corporation on 17.5.06 to study the performance of Energy Saving Project, which was implemented by M/s.Sahastronics Ltd., the partner firm of M/s.Real Energy. After studying the performance of Energy Saving Project in Nasik Municipal Corporation, the Council in its Resolution No.61, dt.29.5.06, approved the energy saving project for Municipal street lighting including maintenance in city area and also approved the bid of M/s.Real Energy with the below mentioned conditions.

1. To enhance performance guarantee from Rs.15.00 Lakhs to Rs.50.00 Lakhs.
2. To implement pilot project for a period of 3 months in one selected area and after satisfactory performance only the contract will be extended.
3. To install all equipment in one year period and arrange computerized control room and to maintained street lighting system with remote control.
4. If above 41.50% saving is achieved, in that 75% share to be given to VMC and 25% to the M/s.Real Energy firm.
5. The materials used for maintenance are of high quality and those approved by officials only.
6. Not to make any inconvenience to the public by implementing this Energy Saving Project.

Vijayawada Municipal Corporation also gave order for energy auditing of water works and office building. After getting audit report, Vijayawada Municipal Corporation will implement energy saving project for pump sets and in offices also.

The contract was finally implemented from 01.12.2006, more than a year after the tenders were called and six months after the tenders were approved by the Council. In the Government itself, it took nearly six months and approval by seven different Secretariat Departments before the Project could be operationalized. This unduly long delay again highlights the problem of bureaucracy associated with implementing such reforms in Government.

ANNEXURE A

The salient features of the project

- Total number of lights 26,968
- Number of Control Boxes 427
- Total present load of street lighting 2660 KW
- Average working hours/day 11 hours
- Annual energy consumption 106.80 lakh units.
- Annual expenditure on CC charges 106.80 x Rs. 3.85
(= Rs.411.18 lakhs)
- Present annual expenditure on maintenance of Street lighting. Rs.53.04 lakhs
- Annual saving on C.C.Charges (Assuming min 41.5% saving) Rs.411.18 x 41.5%
(= Rs.170.64 lakhs)
- Annual share of savings of CC charges to the ESCO 92.7% of Rs.170.64 lakhs
(= Rs.158.18 lakhs)
- Annual share amount to VMC 7.3% of Rs.170.64 lakhs
(= Rs.12.46 lakhs).
- Contract period 5 years
- Net annual savings of VMC (Savings share + Maintenance Expenditure) Rs.12.46lakhs+Rs.53.04 lakhs
(=Rs 65.50 lakhs)
- Total savings in 5 years Rs.327.5 lakhs
- After 5 years, the energy savings equipment, worth Rs.3.00 Cr will be left with VMC. With depreciation, it will be worth Rs 2 Cr.
- Therefore at the end of 5 years, VMC will get a total benefit of Rs.6.25 Cr
- After 5 years, VMC will get annual savings of Rs.170.64 lakhs in CC charges for street lighting.

ANNEXURE B

Schedule of existing street lighting infrastructure of VMC

The VMC is having the following streetlights with a total load of 2660 KW, with average burnings hours 11 hrs/day and 427 control points.

1.	40 W tube lights	20780 Nos
2.	250W SV lights	3125 Nos
3.	150 W SV lights	2263 Nos
4.	70W SV lights	188 Nos
5.	400 W SV lights	207 Nos
6.	125 W MV lights	83 Nos
7.	250W MV lights	283 Nos
8.	400 W metal hallide lights	39 Nos

ANNEXURE C

Terms of Reference of the O&M Contractor

- The firm shall achieve at least 30% energy saving by adopting any or combinations of following options
 - a) Providing suitable energy savers / control panels / timer equipment.
 - b) Replacement of tube light lamps / accessories / fittings in full or partial with lamps / accessories / fittings which give optimum energy savings.
 - c) Replacement of MV lamp fittings and metal halide lamp fittings with SV lamp fittings for bringing uniformity in lamps and fittings (variety reduction) and better lighting / lumen control.
 - d) Dimming can be allowed after 23.00 hours within permissible limits in a day which shall not effect the life of lamps / fittings.
 - e) Any other mode of energy savings which do not effect life of lamps / fittings and lumens.
 - f) Due to change in lamp / fittings additional harmonics shall not be induced to the system.

The bidder has to quote his bid taking existing light fittings / accessories with buy back offer.

- Pilot demonstration will have to be carried out by the successful bidder.
- Operation and maintenance of all the tube lights, mercury, metal halide lamps, and S.V. lamp fixtures and equipment's under the project area shall have to be carried out by the bidder.
- The equipment shall be suitable for operation for an input voltage of 170V-270 V without going into Bypass mode.
- Real Time Based Automatic operation of lights has to be done depending upon seasonal variations of sunset and Sunrise timings. Operation times should be programmable **for fortnightly.**

- Power factor should be greater than 0.9 after improvement.
- Illumination level should be maintained to present existing level or to match international LUX levels for street lighting from 18.00 hours to 23.00 hours in a day *as per BIS*.
- 30% of energy saving should be guaranteed on connected load base line energy consumption. System should provide conditioned regulated controlled voltage without any fluctuations to the light load.
- In case the firm is unable to *achieve* quoted energy saving balance amount shall be paid after deducting the guaranteed amount payable to VMC. However no payment shall be made to the firm incase the firm fails to achieve minimum percentage of energy saving as mentioned in the bid document.
- The firm should utilize ISI mark / *ISO approved manufacturer* materials or the materials approved by the departmental authorities only.
- Centrally Networked Energy control, tracking and monitoring system shall be provided which enables to get real time data acquisition, complaints, on line energy consumption, status of glowing and fused lights, power theft monitoring etc. Thus monitoring of energy shall be done remotely using suitable wireless communication.
- Burglar alarm with hooters in control panel and also remote intimation of unauthorized opening of control panels at control room shall be provided.
- All timers should be remotely and on site programmable and real time clock should be remotely correctable.
- Bidding Company should have a annual turn over of at least Rs.1.00 Crore in any one year of the last five years. Supporting documents should be enclosed.
- Bidding Company should have successfully completed the project of *energy saving for the street lights of at least 1000 KVA on ESCO basis of* similar nature in any City Municipal Corporation or City Development Authority.